Applied Psycholinguistics **34** (2013), 443–460
doi:10.1017/S0142716411000828

Written composition performance of students with attention-deficit/ hyperactivity disorder

ANA MIRANDA CASAS and MANUEL SORIANO FERRER
Universidad de Valencia

INMACULADA BAIXAULI FORTEA
Universidad Católica San Vicente Mártir

Received: November 5, 2009 Accepted for publication: July 26, 2011

ADDRESS FOR CORRESPONDENCE
Ana Miranda Casas, Department of Developmental and Educational Psychology, University of Valencia, Avda. Blasco Ibañez, 21, Valencia 46010, Spain. E-mail: Ana.Miranda@uv.es

ABSTRACT
Attention-deficit/hyperactivity disorder (ADHD) is frequently associated with learning disabilities. The present study examined the written composition of children with ADHD, which depends to a large degree on continuous self-regulation and attentional control skills for organizing information and maintaining the level of effort. Fifty children with ADHD and 50 normally developing children, matched on age and IQ, were assessed using a composition writing task. The results contribute to prior research findings by showing that the children with ADHD performed significantly worse than the comparison groups on the majority of the planning, translation, and revision process measures usually employed to assess the quality of written compositions. Deficiencies in executive functioning or poor linguistic and metalinguistic competence could account for the results found. More research is needed to clarify the underlying causes of the written composition performance profile of children with ADHD.

Attention-deficit/hyperactivity disorder (ADHD), whose main symptoms are inattention, hyperactivity, and impulsivity, is one of the most frequent neurodevelopmental disorders in childhood, affecting approximately 5% of school-age children. ADHD produces a broad spectrum of academic problems, limitations in daily living skills, low social competence, and motor problems (Barkley, 2005; Matza, Swensen, Flood, Secnik, & Leidy, 2004; Sawyer et al., 2002). Unfortunately, in more than half of the cases, this complex disorder persists into the stage of adult life (American Psychiatric Association, 1994), with long-term consequences that include loss of productivity, healthcare consumption, criminality, material damage, loss of years of life, and other costs (Bernfort, Nordfeldt, & Persson, 2008).

© Cambridge University Press 2011 0142-7164/11 $15.00

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

In the past few years, the underlying heterogeneity of ADHD has been shown, as various subgroups have been identified, each characterized by a specific profile of alterations that influence the severity and progression of the disorder (Sonuga-Barke, 2005). In this regard, the association between ADHD and learning disabilities (LDs) has very negative repercussions, especially in the academic context (Faraone, Biederman, Monuteaux, Doyle, & Seidman, 2001). Furthermore, the LD make up one of the conditions that most often appear associated with ADHD, with a much greater prevalence than what is found in the general population (Brook & Boaz, 2005; Fletcher, Shaywitz, & Shaywitz, 1999). Approximately 50% of students with ADHD are also classified as LD (Schnoes, Reid, Wagner, & Marder, 2006). Moreover, in children with a clinical diagnosis of ADHD, an LD in written expression is twice as common as problems in reading, math, or spelling (Mayes, Calhoum, & Crowell, 2000). However, despite the high prevalence of difficulties in written expression in children with ADHD, and the subsequent effect on their academic performance and intellectual and social development (Bruning & Horn, 2000), research on this topic is very scarce in comparison with the number of studies that have been dedicated to reading (Marzocci et al., 2008; Miranda, Soriano, & García, 2006; Purvis & Tannock, 2000; Shanahan, Yerys, Scott, Willcutt, & Pennington., 2006; Willcutt et al., 2007) or mathematics (Lucangeli & Cabrele, 2006; Miranda, Meliá, & Marco, 2009; Zentall, Smith, Lee, & Wieczorek, 1994).

Without a doubt, the executive functions contribute decisively to the development of writing skills in elementary school students (Altemeier, Jones, Abbott, & Berninger, 2006). The comparison of good and poor writers of narrative texts shows that the poor writers have specific difficulties on measures of initiating responses and shifting response set, set inhibition, and set switching (Berninger, 2006; Hooper, Swartz, Wakeley, de Knif, & Montgomery, 2002). In the elaboration of a written composition, a series of executive skills are involved, such as focusing attention, working memory, planning and organizing the text according to a purpose, and continuous monitoring of performance. The competent writer must pay attention to different actions simultaneously, holding them in the memory and regulating their correct execution at the appropriate time. If the demands of the task exceed the available resources, which is the case of a large number of students with ADHD, the system can become overloaded, leading to interference in the flow of the information necessary for the writing task (Alamargot & Chanquoy, 2001; Hayes & Flower, 1980). In this sense, and according to the explanatory model of ADHD based on executive dysfunction (Barkley, 1997; Niggs, 2001), when writing essays the students who suffer from ADHD would be likely to have problems with retaining ideas in their minds, acting upon and organizing ideas, quickly retrieving grammar, spelling and punctuation rules from long-term memory, manipulating all this information, remembering ideas to write down, organizing the material in a logical sequence, and then reviewing and correcting errors.

Most of our understanding of the writing process has been based on the model developed by Hayes and Flower (1980, 1987; Hayes, 1996). These authors proposed a model of writing that describes phases of mature or expert writing in three processes: (a) the planning processes are engaged to prepare the content of the text by retrieving ideas from the writer's long-term memory and organizing

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

them if necessary; (b) the translation process grammatically encodes the conceptual structure elaborated during planning by retrieving the syntactic and morphological properties of this content from the mental lexicon. Orthographic encoding is further needed prior to handwriting. With the motor execution process, writers graphically transcribe their text; and (c) the revision process (reading and editing) allows writers to compare the segments of the text not yet handwritten or the text already written with their mental representation of the intended text. It is important to point out that these writing processes are not activated linearly. Instead, each process can interrupt any other process at any time during the composition.

Hayes and Flower (1980, 1987; Hayes, 1996) argued that writers are overloaded when they compose a text because of the heavy demands the activity places on the working memory. Later, Kellogg (1996, 1999) included the Hayes and Flower proposal in the model he elaborated about the relationships between writing and working memory. Within that framework, several studies have confirmed the existence of demands on the verbal and visual working memory and attentional demands on the central executive during written composition (Kellogg, 1987; Olive, Kellogg, & Piolat, 2008).

The few studies that have dealt with textual aspects related to planning in children with ADHD, specifically coherence, describe poorly articulated compositions in which information is accumulated in an enumerative manner, without following a logical thread. Re, Pedron, and Cornoldi (2007) reached these conclusions after using a variety of tasks based on different elicitation stimuli (visual and auditory) and types of text (descriptive and narrative). Meanwhile, Rodríguez and García (2008) analyzed the effects of two factors—ADHD and writing LDs—on the productivity, coherence, and quality of the written composition. The most interesting contribution of this study stemmed from the use of the triple task, one of the online instruments for evaluating writing (Olive, Kellogg, & Piolat, 2001). According to the conclusions of this study, the children with ADHD made little use of composition processes like thinking about the composition, making an outline, or correcting it. This finding justifies that their texts have less quality, coherence, and structure. Along the same lines, García et al. (2007) carried out a study in which they differentiated ADHD subtypes according to their performance on various written composition measures. Although all the subtypes analyzed showed deficits on parameters such as overall coherence or the thread of the argument, the inattention subtype also showed difficulties on other variables, such as relevance of the information or the lexical indicators (e.g., lexical repetition), the latter being related to the translation process.

Specifically, related to the translation process, the research has considered various indices of textual productivity, generally concluding that students with ADHD write shorter texts with fewer words (Re et al., 2007; Resta & Elliot, 1994). With regard to the measures of a morphosyntactic nature, the studies refer to texts with a lower number of sentences (García et al., 2007; Soriano, García, & Baixauli, 2008), subordinate clauses (Re et al., 2007), and functional words (García et al., 2007), although no differences were found with regard to the mean length of the utterances (Miranda et al., 2006). In the same way, from a lexical point of view, the compositions of children with ADHD contain a basic vocabulary lacking in

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

diversity, which leads to a tendency to repeatedly state certain terms (Soriano et al., 2008).

In another vein, the studies that have dealt with the analysis of the mechanical aspects of writing show that students with ADHD make more spelling and grammatical errors (Gregg, Coleman, Stennett, & Davis, 2002; Re et al., 2007). Likewise, the motor control problems of children with ADHD are well known (Schoemaker, Ketelaars, van Zonneveld, Minderaa, & Mulder, 2005) and reflected in handwriting alterations that make their texts difficult to read (Adi-Japha et al., 2007; Brossard, Majnemer, Shevell, & Snider, 2008).

Regarding the revision process, we have found no study that has specialized in this area in the population of children with ADHD. This fact is surprising, given the involvement of self-regulation in the revision process (Hacker, 1994; Scardamalia & Bereiter, 1986) and the evidence studies have provided supporting the deficit in executive functioning as a main neuropsychological problem of ADHD (Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005). Only the study by García et al. (2007) includes revision as a partial measure of the writing process, concluding that these students use this revision phase significantly less in their compositions.

In sum, although many noteworthy advances have been made in the study of the writing performance of students with ADHD, various limitations can be detected when reviewing the studies on this topic. One limitation is that the majority of the studies that have dealt with the analysis of higher order processes like coherence or textual cohesion (García et al., 2007; Re et al., 2007; Re & Cornoldi, 2010; Reid & Lineman, 2006; Thompson & Reid, 2010) have used assessment procedures based on holistic quality ratings and, to a lesser degree, quantitative measures of writing abilities. Other limitations are related to the small sizes of the samples studied (Brossard et al., 2008), and to the criteria used for selecting them, which are mainly based on the detection of symptoms by the teacher, instead of applying rigorous clinical diagnostic criteria (García et al., 2007; Re et al., 2007). Finally, only the study by Rodríguez and García (2008) dealt with the three basic components of writing, including the revision component, which is of special interest in the study of possible writing difficulties in children with ADHD.

With these considerations in mind, the purpose of the present study was to carry out an in-depth examination of the writing performance of children with a clinical diagnosis of ADHD. For this purpose, the performance of children with ADHD was compared to that of children without ADHD on a written narration task. The main question of interest was to identify the specific problems of children with ADHD in writing a story with a familiar topic, using for the analysis different textual indicators of the phases included in the Hayes and Flower model (1980, 1987; Hayes, 1996): planning, translation and revision.

METHOD

Participants

The participants were 100 students selected for the experimental and control groups. Most of the children were from families with a medium to low socioeconomic status, but without cultural or environmental disadvantages. The majority

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

of the parents were professionals (22.8% of the ADHD group, 26% of the control group), performed administrative or commercial jobs (28.7% of the ADHD group, 24.9% of the control group), or worked in the services sector (26.1% of the ADHD group, 25.7% of the control group).

All of the subjects were Caucasian and spoke Spanish as their primary language. They ranged in age from 9 to 14 years ($M = 12$ years, 1 month; $SD = 1$ year, 9 months). They were students in primary and secondary education from different schools in Valencia (Spain).

Of the entire sample, 50 children had ADHD, whereas the remaining 50 made up the comparison group of children without ADHD. The cases with ADHD were recruited from children referred by general healthcare pediatricians to the children's neurology service at La Fe Hospital, due to presenting typical symptoms of the disorder. Of the cases referred, subjects only went on to the screening phase if they had scores of $T > 65$ on Conners' ADHD index from the Conners' Rating Scales, parent (Conners et al., 1998) and teacher (Conners et al., 1998) versions, which were given to the families on their first visit to the neuropsychiatric service.

The children who met the cutoff point on Conner's index were evaluated by the child neurologist and clinical psychologist at the children's neurology service of La Fe Children's Hospital in Valencia (Spain). Finally, 50 children were diagnosed with ADHD according to the following criteria: a clinical diagnosis of combined subtype ADHD (American Psychiatric Association, 1994), with strict agreement between a parent and teacher about the presence of at least six symptoms of inattention and at least six symptoms of hyperactivity/impulsivity, including (a) duration of the symptoms of more than 1 year; (b) problem appeared before the age of 7; (c) an IQ score of 80 or more as measured by the Wechsler Intelligence Scale for Children—Revised (WISC-R; Wechsler, 1993); and (d) exclusion criteria included psychosis, autism, neurological damage, epilepsy, or sensory or motor deficits. Of the total sample, 48% of the participants were receiving psychostimulants, the medication commonly used in Spain in the treatment of ADHD. The administration of the medication was interrupted 72 hr before the tests were applied.

To obtain the comparison group without ADHD (50 subjects), the collaboration of the school psychologist was requested. The criteria that were adopted to select the children were (a) normal academic progress; (b) an IQ score above 80 on the WISC-R; and (c) absence of language or learning problems, psychosis or neurological damage, sensory deficits, or motor deficits. The information about the children's developmental and academic history was obtained from the school records available to the school's psychoeducational support services.

Specifically, of the 100 children who made up the entire sample, 85 were boys and 15 girls, representing 85% and 15%, respectively. Likewise, of the 50 children who made up the group with ADHD, 98% were boys and 2% were girls; and of the 50 children in the comparison-normal group, 72% were boys and 28% were girls.

In addition, there were no differences between the children in the ADHD group and those in the comparison group on age, $F\ (1, 98) = 0.125$, $p < .724$, Cohen $d = -0.07$, or total IQ (WISC-R; Weschler, 1993), $F\ (1, 98) = 0.138$, $p < .711$, Cohen $d = -0.08$.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

Procedure

There is no consensus in the literature regarding the best way to collect a written language sample (Hudson, Lane, & Mercer, 2005). Following the objectives of this study, a text composition task was chosen, which consisted of asking the children to write a spontaneous essay about a personal experience, specifically a trip. They were given the following instructions: "Now we are going to write an essay. You have to write here everything you can think of about a trip you took." The children were given as much time as they needed to complete the written essays, but the majority of the participants finished writing in 15 min.

Afterward, the children played at being teachers. They were told that, just as teachers do, they had to revise what they had written and correct the errors they thought they had made with a red pen, or introduce any changes they thought would improve their composition (e.g., spelling errors, punctuation marks, add, eliminate or change words or sentences in the text). The task was administered to the children by one of the authors individually in a noise-free room in La Fe Children's Hospital during one session.

Dependent measures

For the evaluation of the written narrative, different types of text indicators were selected. They reflect on textual production aspects of the planning, translation, and revision phases. To do so, we relied on variables that traditionally have been used in rating narrative discourse (for a review, see Hughes, McGillivray, & Schmidek, 1997) or that are usually included in standardized tests and evaluation scales for this type of discourse (Bishop, 2004; Gillam & Pearson, 2004; Strong, 1998). The measures selected have also been used in studies on the skills of children with ADHD in oral (Francis, Fine, & Tannock, 2001; Miranda, Ygual, & Rosel, 2004) and written (García et al., 2007; Re et al., 2007) discourse.

Text indicators related to the planning process. A distinction was made between two types of indicators of the planning process, related to coherence and textual cohesion, respectively. The coherence was rated according to the structure, time sequencing errors, and digressions or content errors. In contrast, the cohesion was rated according to the use of referential expressions and the use of different types of connective cohesion procedures.

STRUCTURE. A score of 1 point was given for the presence of each of the three basic parts of a narration (range = 0–3; maximum score = 1, minimum score = 0): setting (statements about place, time and/or characters in the story), plot (order of events in the story) and conclusion (resolution or end of the story).

TIME SEQUENCE ERROR. A score of 1 point was given for each alteration in the chronological order of the events related in the composition.

CONTENT ERRORS OR DIGRESSIONS. The statements were included that were not semantically related to the topic of the surrounding linguistic context

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

and affected local coherence, as well as the utterances that were not related to the general topic of the composition and affected overall coherence. One point was given for each of the off-topic statements found.

COHESIVE ADEQUACY. This measure was derived by counting the incomplete and ambiguous references (Liles, 1985). Incomplete references were those in which the information referred to by the cohesive markers was not provided in the text. Ambiguous references were those that led to an incorrect interpretation of the text. Therefore, higher scores on this variable indicate a worse performance level.

CONNECTIVE COHESION. This was rated based on the use of connectors that establish different relationships (time, causal, additive, etc.) among the statements and paragraphs of the text. In this way, a count was taken of the total number of connectors used.

Indicators of the translation process. We differentiated between three types of indicators. The first, related to the morphosyntax, included the number of words, the number of sentences, the mean length of the utterances, the index of syntactic complexity, and the morphosyntactic errors. The second indicator referred to the lexical diversity of the narrations, whereas the last one included the number of errors of a mechanical or formal nature.

NUMBER OF WORDS. These are the number written in each writing sample.

NUMBER OF SENTENCES. The sentences were counted in each composition, considering as a sentence the grammatical unit made up of a subject and a predicate that included a personal form of a verb (Gómez Torrego, 1997).

MEAN LENGTH OF UTTERANCE IN WORDS (MLUw). This was calculated by dividing the number of words by the number of utterances. In this way, we follow the word counting modality (Clemente, 1989), which is more easily applicable to synthetic languages like Spanish with a great morphological richness.

SYNTACTIC COMPLEXITY INDEX. To obtain this measure (Scarborough, 1990), we followed the Spanish adaptation by Siguán, Colomina, and Vila (1990). Specifically, the number of subordinate clauses and compound verbs was divided by the total number of utterances.

MORPHOSYNTACTIC ERRORS. A count was made of the errors related to gender and number agreement, subject–verb agreement, word order in sentences, omissions, substitutions or additions of functional words (e.g., articles, prepositions, adverbs).

TYPE–TOKEN RATIO CORRECTED. This (Templin, 1957) was obtained by counting the total number of content words (tokens) and dividing this number into the number of different content words (types).

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

FORMAL ERRORS. A count was made of the spelling errors (phonological and orthographical inaccuracy) and the handwriting errors (i.e., illegible words and letters).

Indicators of the revision process. With regard to revisions, two major types of modifications were distinguished: surface or formal revisions and meaning or deep revisions (Chanquoy, 2001). In addition, two other dependent variables were computed: uncorrected formal errors and uncorrected content errors.

FORMAL REVISIONS. Formal revisions were considered as the punctuation mark and spelling corrections, and the rewriting of unreadable words.

CONTENT REVISIONS. This kind of revision involves word, phrase, clause, or sentence deletions, additions, shifting and transformations.

UNCORRECTED FORMAL ERRORS. These were obtained by subtracting the formal revisions from the formal errors.

UNCORRECTED CONTENT ERRORS. These were obtained by subtracting the content revisions from the content errors.

The compositions were rated by one of the authors of this study and four people with degrees in psychology who attended a training course consisting of three sessions lasting 2 hr each. These raters were blind with respect to the goals of the study, and they did not know whether a participant was in the ADHD group or the control group. After the training sessions, the raters analyzed a 16-composition sample chosen at random. A percentage of interevaluator agreement of 91.5% (range = 80–100%) was obtained on the different variables used in the analysis. The percentage obtained indicated a substantial level of agreement.

RESULTS

A between-groups analysis of covariance (ANCOVA) was performed for each of the measures, using gender as a covariate. Bonferroni adjustment was used, dividing 0.05 by the number of F tests. Thus, we used an α level of 0.01 for planning indicators, an α level of 0.007 for translation indicators, and an α of 0.0125 for revision indicators. Furthermore, we report effect size using the Cohen d (Cohen, 1988). ADHD participants were recorded as the comparison group, so that the d estimation of effect size would remain positive when individuals with ADHD scored lower on the variables.

Results on text indicators related to planning

The ANCOVAs showed (see Table 1) that there were significant differences in text structure, $F(1, 97) = 41.547$, $p < .000$, Cohen $d = -1.3$, and temporal sequence errors, $F(1, 97) = 8.176$, $p < .005$, Cohen $d = .67$, in the group of children with ADHD.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

Table 1. *Results of subjects with ADHD and comparison group on planning measures*

	ADHD ($N = 50$)	Comparison Group ($N = 50$)	F (1, 97)	p	Cohen d
Text structure					
M	1.96	2.84	41.547	.000	−1.3
SD	0.90	0.42			
Temporal sequence errors					
M	0.50	0.10	8.176	.005	0.67
SD	0.76	0.41			
Content errors or digression					
M	1.10	0.12	16.509	.000	0.73
SD	1.82	0.58			
Cohesive adequacy					
M	0.58	0.22	5.279	.024	0.39
SD	1.08	0.76			
Connective cohesion					
M	6.80	10.5	16.958	.000	−0.90
SD	4.58	3.61			

Note: ADHD, attention-deficit/hyperactivity disorder.

Furthermore, the results of the ANCOVAs showed that the essays written by the children with ADHD differed from those written by the children in the control group with regard to content errors, F (1, 97) = 16.509, $p < .000$, Cohen $d =$ 0.73, and connective cohesion, F (1, 97) = 16.958, $p < .000$, Cohen $d = -0$ .90. However, results did not reach statistical significance for cohesive adequacy, F (1, 97) = 5.279, $p < .024$, Cohen $d = 0.39$, with poorer achievement shown by the children with ADHD.

Results on translation indicators

The ANCOVAs carried out later (see Table 2) indicated that the texts written by the children with ADHD had a lower number of words, F (1, 97) = 56.156, $p =$ .000, Cohen $d = -1.5$, and were made up of fewer sentences than the texts written by the children in the comparison group, F (1, 97) = 18.986, $p = .000$, Cohen $d =$ −0.98. In contrast, the essays of the two groups did not differ as far as the MLUw is concerned, F (1, 97) = 6.731, $p = .011$, Cohen $d = -0.33$.

In addition, the ANCOVAs showed that the texts written by the children in the ADHD group presented less syntactic complexity, F (1, 97) = 8.694, $p =$ .004, Cohen $d = -0.57$, and the ADHD group made more formal errors than the children in the comparison group, F (1, 97) = 8.322, $p < .005$, Cohen $d = 0.66$.

In contrast, the essays of the two groups did not differ on the degree of variability in the lexicon used, F (1, 97) = 4.071, $p = .046$, Cohen $d = 0.50$, or morphosyntactic errors, F (1, 96) = 6.986, $p = .010$, Cohen $d = 0.53$.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

Table 2. *Results of subjects with ADHD and comparison group on translation measures*

	ADHD ($N = 50$)	Comparison Group ($N = 50$)	F (1, 97)	p	Cohen d
Number of words					
M	73.16	115.04	56.156	.000	−1.5
SD	32.72	24.50			
Number of sentences					
M	11.30	16.14	18.986	.000	−0.98
SD	5.36	4.55			
Mean length of utterance in words					
M	6.79	7.38	6.731	.011	−0.33
SD	1.96	1.65			
Syntactic Complexity Index					
M	0.35	0.46	8.694	.004	−0.57
SD	0.23	0.15			
Morphosyntactic errors					
M	2.12	1.17	6.986	.010	0.53
SD	2.16	1.4			
Type-token ratio					
M	0.82	0.78	4.071	.046	0.50
SD	0.09	0.07			
Formal errors					
M	4.05	1.61	8.322	.005	0.66
SD	4.95	1.82			

Note: ADHD, attention-deficit/hyperactivity disorder.

Results on revision indicators

The results of the ANCOVA (see Table 3) showed that there were no significant differences in the number of formal revisions, F (1, 97) = 2.654, $p = .107$, Cohen $d = -0.49$, or with regard to the content revisions, F (1, 97) = 0.038, $p = .845$, Cohen $d = -0.06$. By contrast, in the writing of the children with ADHD, a higher percentage of noncorrected content errors was found, F (1, 97) = 8.196, $p = .005$, Cohen $d = 0.58$, although no differences were observed between the two groups on noncorrected formal errors, F (1, 97) = 0.481, $p = .489$, Cohen $d = 0.26$.

DISCUSSION

The purpose of this study was to delve more deeply into the study of the writing difficulties of students with ADHD, analyzing different indicators of their performance on written compositions. The results obtained showed that the students with ADHD are less proficient writers, because they show a significantly inferior performance compared to that of their peers on the majority of the variables evaluated.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

Table 3. *Results of subjects with ADHD and comparison group on revision measures*

	ADHD ($N = 50$)	Comparison Group ($N = 50$)	F (1, 97)	p	Cohen d
Formal revisions					
M	0.56	1.50	2.654	.107	−0.49
SD	1.03	2.5			
Content revisions					
M	0.50	0.57	0.038	.845	−0.06
SD	1.06	1.03			
Uncorrected formal errors					
M	−0.94	−2.67	0.481	.489	0.26
SD	8.44	4.15			
Uncorrected content errors					
M	0.60	−0.44	8.196	.005	0.58
SD	2.26	1.24			

Note: ADHD, attention-deficit/hyperactivity disorder.

In the first place, in the textual planning, the group of children with ADHD obtained significantly inferior overall results on measures of text structure, time sequencing, digressions, and the use of connectors. These findings agree with those obtained in other studies on the topic, in both the oral modality (Francis et al., 2001) and the written one (García et al., 2007; Re et al., 2007).

Specifically, on the text structure, the children with ADHD showed difficulty in articulating an organizational plan directed toward a purpose, even though the narrative outline is the textual genre that is learned first from a developmental point of view (Peterson & McCabe, 1983). This result may be affected, among other factors, by the problems of these students in the central executive and in the visuospatial sketchpad (Martinussen, Hayden, Hogg-Johnson, & Tannock, 2005; Rapport et al., 2008), which is activated when the writer creates a mental visualization of the form of the paper and organizes the arrangement of ideas and supporting details in it (Hayes, 1996; Le Bigot, Passerault, & Olive, 2009; Vanderberg & Swanson, 2007).

There were also important alterations detected in the time sequencing of the events in the compositions of the children with ADHD, and a significant number of digressions or incoherent sentences. The findings suggest a processing style based on an accumulation of ideas that interfere with each other. Inhibitory control problems could be impeding the suppression of the activation of irrelevant information (Fillmore, Milich, & Lorch, 2009). One objective for future studies would consist of investigating the involvement of inhibition deficits in event sequencing alterations and the digressions found in the narrations of students with ADHD, by directly evaluating the inhibition skills.

Our data also show that the children with ADHD used significantly fewer connectors, linguistic units whose purpose is to explicitly link the formal and

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

semantic arrangement of the different parts of the text. In compensation, they chose other ways of linking the text, like juxtaposing or concatenating sentences, just as occurs in the oral colloquial register (Briz, 2001). It would be necessary to carry out a more detailed study to verify whether the children with ADHD also make greater use of connectors with a more general meaning (like the polyfunctional conjunction *and*) instead of connectors that are more complex from a semantic point of view (consecutive, causal, etc.). In this sense, it is worth pointing out the difficulties experienced by children with ADHD with the comprehension of causal relationships, one of the key aspects of narrative text (Lorch et al., 2004).

In contrast, and unlike the data provided by other studies on oral discourse (Tannock, Purvis, & Schachar, 1993), our study does not show a tendency pattern of differences between the children with ADHD and the children without ADHD in the correct use of referential cohesion (cohesive adequacy). This finding is somewhat unexpected, as cohesive adequacy requires the retrospective and prospective functions of the operative memory, a deficient area in children with ADHD. Thus, to dominate this aspect it is necessary to consider whether or not to introduce a certain referent and select the appropriate linguistic form, so that the speaker can correctly identify it. The result obtained may be due to the typological differences between languages. English is a language that requires the obligatory presence of the subject in the sentence. Therefore, the speaker must consider a greater number of linguistic restrictions when formulating a sentence, which places greater cognitive demands on the processing system. In contrast, Spanish is a pro-drop language that allows the omission of the subject and, thus, presents a greater flexibility in making the referents in the text explicit. This difference probably leads to the disparity in results between the two languages studied. However, only a detailed analysis of the referential procedures used would make it possible to find out whether the children with ADHD use more immature mechanisms like mere lexical repetition (Karmiloff-Smith, 1983), instead of more complex linguistic strategies (the use of pronouns, for example). Although lexical repetition assures the identification of the referents in the text, its use leads to a highly redundant discourse and is indicative of a less rich vocabulary. One piece of data that could point in this direction is the lower amount of lexical diversity found in their writing.

Second, the results obtained for the translation indicators reveal a deficient performance in the group of children with ADHD in comparison with their peers. As in other studies on written expression (Miranda, Soriano, & García, 2006; Re et al., 2007; Resta & Elliot, 1994), the children with ADHD wrote shorter texts with fewer words and sentences. They also showed an inferior syntactic competence that was reflected in the use of a lower number of subordinate clauses and significantly lower scores on the index of syntactic complexity. Consequently, the children with ADHD seem to have a more reduced repertoire of late-acquisition sentence structures, which would denote a certain syntactic immaturity, as with age there is an increase in the index of syntactic complexity and the use of subordinate clauses (Fernández & Aguado, 2007). On the other hand, that the children with ADHD include a lower number of subordinate clauses in their writing may indicate that they avoid making the effort required by this type of linguistic structures. An example of these demands would be using verb tenses or pronouns in a fluid and automatic way when elaborating a subordinate construction.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

In contrast, on the MLUw, there were no significant differences found between the groups of children with and without ADHD. In this sense, we must point out that, despite being one of the most well-known and widely used measures in linguistic analysis (Aguado, 1995; Serra, Serrat, Bel, & Aparici, 2000), it presents some limitations. In fact, the research indicates that its predictive value diminishes with time. Some studies (Scarborough, Rescorla, Tager-Flusberg, Fowler, & Sudhalter, 1991) have shown that the MLUw correlates more weakly with linguistic development when it exceeds three or four words than during the earliest studies of language acquisition. It seems that, from an index equal to 4 on, the measure experiences a ceiling effect; that is, the increase in words does not necessarily imply an increase in grammatical complexity (Fernández & Aguado, 2007). Therefore, this limitation of the measure could justify its lack of sensitivity in this study.

With regard to formal indicators of writing, and coinciding with other studies (Miranda et al., 2006; Re et al., 2007), the children with ADHD made more formal errors; that is, they showed less spelling and handwriting accuracy. Keeping in mind that transcription and reading skills draw on many of the same subprocesses—orthographic and phonological coding—(Berninger, Cartwright, Yates, Swanson, & Abbott, 1994; Shanahan, 2006), deficits in word reading are likely to manifest themselves as spelling difficulties.

Finally, with regard to the revision process, the results showed significant differences between children with and without ADHD on one of the variables evaluated, specifically on uncorrected content errors. Although the children with ADHD were given plenty of time to do so and specific instructions, they are not as capable as their classmates in correcting errors that affect the meaning of the text. They show a worse overall proficiency, as they leave more content errors uncorrected.

In conclusion, our results show that students with ADHD demonstrate a worse performance on different indicators of the main processes of written composition: planning, translation, and revision. This finding suggests that children with ADHD have considerable difficulties on tasks that require organizing and structuring information, which could be related to deficits in executive functioning (Barkley, 2005). As shown in a recent study (Hooper et al., 2011), the language and attention/executive functions (including verbal and nonverbal working memory, attention, planning, and rapid retrieval) are highly associated with written expression. Specifically, the working memory takes care of simultaneously managing a series of processes, such as keeping various ideas alive, recovering morphosyntactic clues from the long-term memory and continuous revision, all of which intervene in the elaboration of a coherent and cohesive text (Kellogg, 1996, 1999; Swanson & Berninger, 1996).

Unfortunately, these difficulties can have a great impact on the daily lives of children with ADHD, not only due to their effect on the comprehension and composition of texts, but also because they might lead to mistakes in social comprehension (Francis et al., 2001). Other issues remain unanswered and are open to future investigation. For example, one limitation in our study is that we did not control for the linguistic and reading ability of the participants. Systematic assessment data were not available to permit formal diagnoses of language or LDs. Thus, a particularly low linguistic and reading ability in the ADHD group could have affected their writing performance. Furthermore, our study did not use direct

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

measures of executive functioning (i.e., working memory, inhibition, set shifting, lexical fluency), which would have made it possible to determine which executive processes are involved in the composition problems of children with ADHD and the explanatory role they play in these deficits. Another point to consider is the broad age range of the participants, so that they could be grouped according to different phases in the development of writing skills.

Furthermore, it is necessary to design standardized instruments with proven reliability and validity, in order to offer a more panoramic view of the writing performance of these students and more precisely identify different performance profiles within the heterogeneity of the disorder. Another valuable contribution would be to evaluate written composition using other types of texts (expository, argumentative) that better fit the demands of the academic curriculum at these ages. An additional topic open to investigation has to do with the nature of the relationship between difficulties in written expression and the different subtypes of ADHD (inattention, hyperactivity–impulsivity, and combined).

In conclusion, the good news is that some recent findings have shown that, once they have been detected, many of the deficiencies observed in the writing of children with ADHD could improve with explicit instruction in different strategies focused on the different phases of written composition. Although scarce, some studies on intervention (De La Paz, 2001; Lienemann & Reid, 2008; Reid & Lienemann, 2006; Thompson & Reid, 2010) have documented the efficacy of instruction using a strategic instruction (SRSD model; Harris & Graham, 1996). The use of mnemonic rules, graphic organizers, and self-instruction has also been shown to produce improvements in the overall quality of compositions. Facilitation techniques (outlines guide) have also been successfully applied by means of collaborative writing activities in children with ADHD (Re, Caeran, & Cornoldi, 2008). Finally, in a recent publication (McCloskey, Perkins, & Dinner, 2009), instructional guidelines were included for executive function difficulties impacting written expression problems. This type of intervention could be a promising route in the written-expression learning difficulties experienced by students with ADHD.

ACKNOWLEDGMENTS

This research was supported by Grant EDU2009-07672 (to A.M.) from the Plan Nacional I+D+I (Ministerio de Ciencia e Innovación).

REFERENCES

Adi-Japha, E., Landau, Y., Frenkel, L., Teicher, M., Gross-Tzur, V., & Shalev, R. S. (2007). ADHD and dysgraphia: Underlying mechanisms. *Cortex, 43*, 700–709.

Aguado, G. (1995). *El desarrollo del lenguaje de 0 a 3 años. Bases para un diseño curricular en la Educación Infantil*. Madrid: Cepe.

Alamargot, D., & Chanquoy, L. (2001). *Through the models of writing*. Dordrecht: Kluwer Academic.

Altemeier, L., Jones, J., Abbott, R. D., & Berninger, V. (2006). Executive functions in becoming writing readers and reading writers: Note taking and report writing in third and fifth graders. *Developmental Psychology, 29*, 161–173.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

Barkley, R. A. (1997). *ADHD and the nature of self-control*. New York: Guilford Press.
Barkley, R. A. (2005). *Attention deficit hyperactivity disorder. A handbook for diagnosis and treatment* (3rd ed.). New York: Guilford Press.
Bernfort, L., Nordfeldt, S., & Persson, J. (2008). ADHD from a socioeconomic perspective. *Acta Paediatrica, 97*, 239–245.
Berninger, V. (2006). A developmental approach to learning disabilities. In L. Siegel & A. Renninger (Eds.), *Handbook of child psychology: Vol. 4. Child psychology and practice*. New York: Wiley.
Berninger, V., Cartwright, A., Yates, C., Swanson, H. L., & Abbott, R. (1994). Developmental skills related to writing and reading acquisition in the intermediate grades: Shared and unique variance. *Reading and Writing, 6*, 161–196.
Bishop, D. V. M. (2004). *Expression, reception and recall of narrative instrument (ERRNI)*. London: Pearson Assessment.
Briz, A. (2001). *El español coloquial en la conversación*. Barcelona: Ariel.
Brossard, R. M., Majnemer, A., Shevell, M., & Snider, L. (2008). Handwriting performance in children with attention deficit hyperactivity disorder (ADHD). *Journal of Child Neurology, 23*, 399–406.
Brook, U., & Boaz, M. (2005). Attention deficit and learning disabilities (ADHD/LD) among high pupils in Holon (Israel). *Patient Education and Counseling, 58*, 164–167.
Bruning, R., & Horn, C. (2000). Developing motivation to write. *Educational Psychologist, 35*, 25–38.
Chanquoy, L. (2001). How to make it easier for children to revise their writing: A study of text revision from 3rd to 5th grades. *British Journal of Educational Psychology, 71*, 15–41.
Clemente, R. A. (1989). Medida del desarrollo morfosintáctico. Los problemas de la medición y utilización de la LME. *Anuario de Psicología, 42*, 103–115.
Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (rev. ed.). New York: Academic Press.
Conners, C. K. (1997). *Conners Parent Rating Scale—Revised manual: Long version (CPRS-R: L)*. North Tonawanda, NY: Multi-Health Systems.
De la Paz, S. (2001). Teaching writing to students with attention deficit disorders and specific language impairment. *Journal of Educational Research, 95*, 37–47.
Faraone, S. V., Biederman, J., Monuteaux, M. C., Doyle, A. E., & Seidman, L. J. (2001). A psychometric measure of learning disability predicts educational failure four years later in boys with attention deficit/hyperactivity disorder. *Journal of Attention Disorders, 4*, 220–230.
Fernández, M., & Aguado, G. (2007). Medidas del desarrollo típico de la morfosintaxis para la evaluación del lenguaje espontáneo de niños hispanohablantes. *Revista de Logopedia, Foniatría y Audiología, 27*, 140–152.
Fillmore, M. T., Milich, R., & Lorch, E. (2009). Inhibitory deficits in children with attention-deficit/hyperactivity disorder: Intentional versus automatic mechanisms of attention. *Development and Psychopathology, 21*, 539–554.
Fletcher, J. M., Shaywitz, S. E., & Shaywitz, B. A. (1999). Comorbidity of learning and attention disorders: Separate but equal. *Pediatrics Clinics of North America, 46*, 885–897.
Francis, S., Fine, J., & Tannock, R. (2001). Methylphenidate selectively improves story retelling in children with attention deficit hyperactivity disorder. *Journal of Child and Adolescent Psychopharmacology, 11*, 217–228.
García, J. N., Rodríguez, C., Caso, A., Fidalgo, R., Arias, O., González, L., et al. (2007). El trastorno por déficit de atención e hiperactividad (TDAH), diferencias entre los diferentes subtipos en la composición escrita. *Análisis y Modificación de conducta, 33*, 149, 369–384.
Gillam, R., & Pearson, N. (2004). *The test of narrative language*. Austin, TX: Pro-Ed.
Gómez Torrego, L. (1997). *Gramática didáctica del español*. Madrid: SM.
Gregg, N., Coleman, C., Stennett, R. B., & Davis, M. (2002). Discourse complexity of college writers with and without disabilities: A multidimensional analysis. *Journal of Learning Disabilities, 35*, 23–38.
Hacker, D. J. (1994). Comprehension monitoring as a writing process. *Advances in Cognition and Educational Practice, 6*, 143–172.
Harris, K., & Graham, S. (1996). *Making the writing process work: Strategies for composition and self-regulation*. Cambridge, MA: Brookline.
Hayes, J. R. (1996). A new framework for understanding cognition and affect in writing. In C. M. Lewy & S. Ransdell (Eds.), *The science of writing: Theories, methods, individual differences and applications* (pp. 1–27). Hillsdale, NJ: Erlbaum.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

Hayes, J. R., & Flower, L. (1980). Identifying the organization of writing processes. In L. W. Gregg & E. R. Steinberg (Eds.), *Cognitive processes in writing* (pp. 3–30). Hillsdale, NJ: Erlbaum.

Hayes, J. R., & Flower, L. (1987). On the structure of the writing process. *Topics in Language Disorders, 7*, 19–30.

Hooper, S. R., Costa, L. J., McBee, M., Anderson, K. L., Yerby, D. C., Knuth, S. B., et al. (2011). Concurrent and longitudinal neuropsychological contributors to written language expression in first and second grade students. *Reading and Writing, 24*, 221–252.

Hooper, S. R., Swartz, C. W., Wakely, M. B., de Kruif, R. E. L., & Montgomery, J. W. (2002). Executive functions in elementary school children with and without problems in written expression. *Journal of Learning Disabilities, 35*, 57–69.

Hudson, R., Lane, H., & Mercer, C. (2005). Writing prompts: The role of various priming conditions of the compositional fluency of developing writers. *Reading and Writing, 18*, 473–495.

Hughes, D., McGillivray, L., & Schmidek, M. (1997). *Guide to narrative language*. Eau Claire, WI: Thinking Publications.

Karmiloff-Smith, A. (1983). Language development as a problem-solving process. *Papers and Reports on Child Language Development, 22*, 1–23.

Kellogg, R. T. (1987). Effects of topic knowledge on the allocation of processing time and cognitive efforts to writing processes. *Memory and Cognition, 15*, 256–266.

Kellogg, R. T. (1996). A model of working memory in writing. In C. M. Levy & S. E. Ransdell (Eds.), *The science of writing* (pp. 57–71). Mahwah, NJ: Erlbaum.

Kellogg, R. (1999). Components of working memory in text production. In M. Torrance, & G. C. Jeffrey (Eds.), *The cognitive demands of writing: Processing capacity and working memory in text production*. Amsterdam: Amsterdam University Press.

Le Bigot, N., Passerault, J.-M., & Olive, T. (2009). Memory for words location in writing. *Psychological Research, 73*, 89–97.

Lienemann, T., & Reid, R. (2008). Using self-regulated strategy development to improve expository writing with students with attention deficit hyperactivity disorder. *Exceptional Children, 74*, 471–486.

Liles, B. Z. (1985). Cohesion in the narratives of normal and language-disordered children. *Journal of Speech and Hearing Research, 28*, 123–133.

Lorch, E. P., Eastham, D., Milich, R., Lemberger, C. C., Sanchez, R. P., & Welsh, R. (2004). Difficulties in comprehending causal relations among children with ADHD: The role of cognitive engagement. *Journal of Abnormal Psychology, 113*, 56–63.

Lucangeli, D., & Cabrele, S. (2006). Mathematical difficulties and ADHD. *Exceptionality, 14*, 53–62.

McCloskey, G., Perkins, L. A., & Dinner, B. V. (2009). *Assessment and intervention for executive function difficulties*. New York: Taylor & Francis.

Martinussen, R., Hayden, J., Hogg-Johnson, S., & Tannock, R. (2005). A meta-analysis of working memory impairments in children with attention–deficit/hyperactivity disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 44*, 377–384.

Marzocchi, G. M., Oosterland, J., Zuddas, A., Cavolina, P., Geurts, H., Redigolo, D., et al. (2008). Contrasting deficits on executive functions between ADHD and reading disabled children. *Journal of Child Psychology and Psychiatry, 49*, 532–552.

Matza, L. S., Swensen, A. R., Flood, E. M., Secnik, K., & Leidy, N. K. (2004). Assessment of health-related quality of life in children: A review of conceptual, methodological, and regulatory issues. *Value in Health, 7*, 79–92.

Mayes, S. D., Calhoum, S. L., & Crowell, E. W. (2000). Learning disabilities and ADHD: Overlapping spectrum disorders. *Journal of Learning Disabilities, 33*, 417–424.

Miranda, A., Meliá de Alba, A., & Marco, R. (2009). Habilidades matemáticas y funcionamiento ejecutivo de niños con trastorno por déficit de atención con hiperactividad y dificultades del aprendizaje de las matemáticas. *Psicothema, 21*, 63–69.

Miranda, A., Soriano, M., & García, R. (2006). Reading comprehension and written composition problems of children with ADHD: Discussion of research and methodological considerations. In T. Scruggs & M. Mastropieri (Eds), *Advances in behavioral and learning disabilities* (Vol. 19, pp. 237–256). Boston: Elsevier JAI Press.

Miranda, A., Ygual, A., & Rosel, J. (2004). Complejidad gramatical y mecanismos de cohesión en la pragmática comunicativa de los niños con TDAH. *Revista de Neurología, 38*, 111–116.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

Niggs, J. T. (2001). Is ADHD a disinhibitory disorder? *Psychological Bulletin, 127*, 571–598.
Olive, T., Kellogg, R. T., & Piolat, A. (2001). The triple task technique for studying the process of writing. In T. Olive & C. M. Levy (Eds.),*Contemporary tools and techniques for studying writing* (pp. 31–58). Dordrecht: Kluwer Academic.
Olive, T., Kellogg, R. T., & Piolat, A. (2008). Verbal, visual, and spatial working memory demands during text composition. *Applied Psycholinguistics, 29*, 669–687.
Peterson, C., & McCabe, A. (1983). *Developmental psycholinguistics: Three ways of looking at a child's narrative*. New York: Plenum Press.
Purvis, K. L., & Tannok, R. (2000). Phonological processing, not inhibitory control, differentiates ADHD and reading disability. *Journal of American Academy of Child & Adolescent Psychiatry 39*, 485–494.
Rapport, M. D., Alderson, R. M., Kofler, M. J., Sarver, D. E., Bolden, J., & Sims, V. (2008). Working memory deficits in boys with attention-deficit/hyperactivity disorder (ADHD). The contribution of central executive and subsystem. *Journal of Abnormal Child Psychology, 36*, 825–837.
Re, A., Caeran, M., & Cornoldi, C. (2008). Improving expressive writing skills of children rated for ADHD symptoms. *Journal of Learning Disabilities, 41*, 535–544.
Re, A., & Cornoldi, C. (2010). ADHD expressive writing difficulties of ADHD children:whwn good declarative knowledge is not sufficient. *European Journal of Psychology of Education, 25*, 315–323.
Re, A. M., Pedron, M., & Cornoldi, C. (2007). Expressive writing. Difficulties in children described as exhibiting ADHD symptoms. *Journal of Learning Disabilities, 40*, 244–255.
Reid, R., & Lienemann, T. (2006). Self-regulated strategy development for written expression with students with attention deficit/hyperactivity disorder. *Exceptional Children, 73*, 53–68.
Resta, S. P., & Elliot, J. (1994). Written expression in boys with attention deficit disorder. *Perceptual and Motor Skills, 79*, 1131–1138.
Rodríguez, C., & García, J. N. (2008). El trastorno por déficit de atención e hiperactividad (TDAH) y las dificultades de aprendizaje en la composición escrita: un estudio comparativo. In J. A. González-Pienda & J. C. Núñez (Eds.), *Actas del V Congreso Internacional de Psicología y Educación* (pp. 1657–1664). Oviedo: Ediciones de la Universidad de Oviedo.
Sawyer, M. G., Whaites, L., Rey, J. M., Hazell, P. L., Graetz, B. W., &, Baghurst, P. (2002). Health-related quality of life of children and adolescents with mental disorders. *Journal of American Academy of Child & Adolescent Psychiatry, 41*, 530–537.
Scarborough, H. (1990). Index of productive syntax. *Applied Psycholinguistics, 11*, 1–22.
Scarborough, H. S., Rescorla, L., Tager-Flusberg, H., Fowler, A. E., & Sudhalter, V. (1991). The relation of utterance length to grammatical complexity in normal and language-disordered groups. *Applied Psycholinguistics, 12*, 23–45.
Scardamalia, M., & Bereiter, C. (1986). Research on written composition. In C. M. Wittrock (Ed.), *Handbook of research on teaching*. New York: Macmillan.
Schnoes, C., Reid, R., Wagner, M., & Marder, C. (2006). ADHD among students receiving special education services: A national survey. *Exceptional Children, 72*, 483–495.
Schoemaker, M., Ketelaars, C., van Zonneveld, M., Minderaa, R. B., & Mulder, T. (2005). Deficits in motor control processes involved in production of graphic movements of children with attention-deficit-hyperactivity disorder. *Developmental Medicine & Child Neurology, 47*, 390–395.
Serra, M., Serrat, E., Bel, A., & Aparici, M. (2000). *La Adquisición del Lenguaje*. Madrid: Ariel.
Shanahan, M., Yerys, B., Scott, A., Willcutt, E. G., & Pennington, B. F. (2006). Processing speed deficits in attention-deficit/hyperactivity disorder and reading disability. *Journal of Abnormal Child Psychology, 34*, 585–602.
Shanahan, T. (2006). Relations among oral language, reading, and writing development. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 171–186). New York: Guilford Press.
Siguán, M., Colomina, R., & Vila, I. (1990). *Metodología para el estudio del lenguaje infantil*. Barcelona: Abril.
Sonuga-Barke, E. J. S. (2005). Causal models of attention deficit/hyperactivity disorder: From common simple deficits to multiple developmental pathways. *Biological Psychiatry, 57*, 1231–1238.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press

Soriano, M., García, R., & Baixauli, I. (2008). Dificultades en la expresión escrita de los niños con TDAH. In J. A. González-Pienda & J. C. Núñez (Eds.), *Actas del V Congreso Internacional de Psicología y Educación* (pp. 1905–1910). Oviedo: Ediciones de la Universidad de Oviedo.

Strong, C. (1998). *The strong narrative assessment procedure*. Eau Claire: Thinking Publications.

Swanson, H. L., & Berninger, V. W. (1996). Individual differences in children's working memory and writing skill. *Journal of Experimental Child Psychology, 63*, 358–385.

Tannock, R., Purvis, K. L., & Schachar, R. J. (1993). Narrative abilities in children with attention-deficit hyperactivity disorder and normal peers. *Journal of Abnormal Child Psychology, 21*, 103–117.

Templin, M. C. (1957). *Certain language skills in children: Their development and interrelationships*. Minneapolis, MN: University of Minnesota Press.

Thompson, L., & Reid, R. (2010). Improving the persuasive essay writing of high school students with ADHD. *Exceptional Children, 76*, 157–174.

Vandenberg, R., & Swanson, H. L. (2007). Which components of working memory are important in the writing process? *Reading and Writing, 20*, 721–752.

Wechsler, D. (1993). *WISC-R. Escala de Inteligencia para Niños Revisada* [Wechsler Intelligence Scale for Children]. Madrid: TEA.

Willcutt, E. G., Betjemann, R. S., Pennington, B. F., Olson, R. K., DeFries, J. C., & Wadsworth, S. J. (2007). Longitudinal study of reading disability and attention-deficit/hyperactivity disorder: Implications for education. *Mind, Brain, and Education, 4*, 181–192

Willcutt, E. G., Doyle, A. E., Nigg, J. T., Faraone, S. V., & Pennington, B. F. (2005). Validity of the executive function theory of the attention deficit/hyperactivity disorder: A meta-analytic review. *Biological Psychiatry, 57*, 1336–1346.

Zentall, S. S., Smith, Y. N., Lee, Y. B., & Wieczorek, C. (1994). Mathematical of attention-deficit hyperactivity disorder. *Journal of Learning Disabilities, 27*, 510–519.

https://doi.org/10.1017/S0142716411000828 Published online by Cambridge University Press